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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of	:	
Fumitoshi YAMASHITA et al.	:	**Attn: BOX PCT**
Serial No. NEW	:	**Docket No. 2002_0214A**
Filed February 27, 2002	:	

PERMANENT MAGNET FIELD SMALL DC MOTOR
[Corresponding to PCT/JP00/05733
Filed August 25, 2000]

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents,
Washington, DC 20231

Sir:

Please amend the above-identified U.S. Patent application as follows:

IN THE SPECIFICATION

Please amend the specification as follows.

Please replace the paragraph beginning on page 3, line 5 with the following new paragraph.

Among the motors having an arc-shaped magnet, regardless whether it is a rare earth magnet or not, known technologies for reducing the cogging torque through a shape of the arc-shaped magnet include making a radius of the outer surface of the arc-shaped magnet to be different from that of the inner surface, or cutting edges at both ends in the circumferential direction of an arc-shaped magnet, thereby making a distribution of flux density in the air-gap closer to a sine curve (an example of the publication: Shogo Tanaka, "Application of Permanent Magnets for Small Motors", page 7 in the proceedings of the Symposium of Small Motor Technology, 1983). Japanese Utility Model Publication No. S49-4651 discloses that, in a permanent magnet field small DC motor, a cut provided in an arc-shaped magnet in the outer surface at both sides off of the center of the magnetic pole suppresses reduction of effective flux at the center of magnetic pole, despite the reduction at the

ATTACHMENT E

cut portion. Although there is no mention about the cogging torque in the Utility Model, there is an indication about a possibility that the cut provided in an arc-shaped magnet in the outer surface at both sides off of the center of the magnetic pole would reduce the cogging torque in a permanent magnet field small DC motor, while controlling deterioration of the rotating torque.

IN THE CLAIMS

Please amend claims 9 as follows.

9. (Amended) An optical pickup device comprising: a permanent magnet field small DC motor comprising an arc-shaped permanent magnet fixed in a soft-magnetic frame, wherein said magnet is provided with an outer surface at both ends in a thrust direction that fits along an inner surface of said soft-magnetic frame, and a certain region in a middle part in the thrust direction of said magnet at both ends in the circumferential direction where said soft-magnetic frame does not function as a back yoke.

REMARKS

In view of the above amendments and the following remarks, reconsideration and further examination are requested.

The specification has been reviewed and revised to correct a typographical error. Further claim 9 has been amended to place it in better U.S. form. No new matter has been added. Enclosed is a marked-up copy of the section of the original specification and claim 9 labeled "**Version with Markings to Show Changes Made**" indicating the changes.

Therefore, prosecution on the merits is now respectfully requested.

Respectfully submitted,

Fumitoshi YAMASHITA et al.

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ARTICLE 34 AMENDMENT
(TRANSLATION OF ANNEXES TO THE INTERNATIONAL PRELIMINARY EXAMINATION REPORT)

Assistant Commissioner for Patents,
Washington, DC 20231

Sir:

Kindly replace original pages 20-22 (containing original claims 1-9) with attached pages 20 and 21 (containing amended claims 1-9).

Respectfully submitted,

Fumitoshi YAMASHITA et al.

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ATTACHMENT C

What is claimed is:

1. A permanent magnet field small DC motor comprising: arc-shaped magnets having a maximum thickness of 1 mm or less, fabricated by compression molding from rare earth iron based melt-spun flakes and a binder, fixed in a state opposing each other with an armature in between in a soft-magnetic frame with outer surfaces of the magnets at both ends in a thrust direction fitting along an inner surface of the soft-magnetic frame, wherein

said magnets are provided on the outer surfaces with a certain region in a middle part in the thrust direction at both ends in a circumferential direction where the soft-magnetic frame does not function as a back yoke.

2. The permanent magnet field small DC motor of claim 1, wherein

the arc-shaped rare earth magnets are provided with a plane surface at an angle θ 53° - 82° to the curving outer surface of the compression mold, in the middle part in the thrust direction at both ends in the circumferential direction for forming a region where the soft-magnetic frame does not function as the back yoke.

3. The permanent magnet field small DC motor of claim 1, wherein

the curvature of the outer surfaces of the arc-shaped rate earth magnets in the middle part in the thrust direction are made to be different from that of the outer surface at both ends in the thrust direction in the compression mold so that the soft-magnetic frame does not function as the back yoke at the region of the outer surface in the middle part in the thrust direction at both ends in the circumferential direction.

4. The permanent magnet field small DC motor of claim 1, wherein

a pair of arc-shaped permanent magnets opposing to each other are disposed in the soft-magnetic frame with the outer surface at both ends in the thrust direction fitting along

the inner surface of the soft-magnetic frame and fixed at both ends in the circumferential direction using a spring.

5. The permanent magnet field small DC motor of claim 1, wherein

a pair of arc-shaped rare earth magnets opposing to each other fixed along the inner surface of the soft-magnetic frame exhibits different demagnetization curves at least by unsaturated magnetization.

6. The permanent magnet field small DC motor of claim 1, wherein

a distribution of flux density in an air-gap with the armature iron core is controlled by once magnetizing the pair of arc-shaped rare earth magnets opposing each other fixed along the inner surface of soft-magnetic frame and then providing an initial demagnetization by heat so that a rate of demagnetization increases along with a distance from a center of magnetic pole towards the ends in the circumferential direction, eventually making the demagnetization rate reaching the greatest at a clearance formed between the middle part of the outer surface in the thrust direction at both ends in the circumferential direction and the soft-magnetic frame.

7. The permanent magnet field small DC motor of claim 1, wherein

the compression molded arcuate rare earth magnets are fabricated from magnetically isotropic rare earth iron based melt-spun flakes, $RE_2TM_{14}B$ (RE is Nd, Pr. TM are Fe, Co) grains of 300 nm or less, intrinsic coercivity Hci 8 - 10 kOe, remanence 7.4 - 8.6 kG , and an epoxy-resin 1.5 - 3 weight%.

8. The permanent magnet field small DC motor recited in claim 1 or claim 7, wherein

the compression molded arc-shaped rare earth magnet contains isotropic rare earth iron based melt-spun flakes of a nano-composite structure having such soft-magnetic phase as αFe, Fe_3B and such hard-magnetic phase as $RE_2TM_{14}B$.

9. The permanent magnet field small DC motor recited in claim 1, claim 7 or claim 8, wherein

the arc-shaped rare earth magnets are fabricated from a granular compound of particle diameter 250 μm or less rare earth iron based melt-spun flakes and an epoxy-resin binder, compression molded and cured.